IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TEXASLDPC INC.,

Plaintiff,

v.

No. 18-cv-1966-SB

BROADCOM INC. et al.,

Defendants.

Gregory Robert Booker, Joseph B. Warden, Warren K. Mabey, Jr., FISH & RICHARDSON, P.C., Wilmington, Delaware; Lawrence K. Kolodney, FISH & RICHARDSON, P.C., Boston, Massachusetts; David M. Hoffman, FISH & RICHARDSON, P.C., Austin, Texas; Bret T. Winterle, Rodeen Talebi, FISH & RICHARDSON, P.C., Dallas, Texas; Michael R. Headley, FISH & RICHARDSON, P.C., Redwood City, California.

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Counsel for Defendants.

MEMORANDUM OPINION

March 30, 2023

BIBAS, *Circuit Judge*, sitting by designation.

Modern wireless technology requires transmitting lots of data rapidly and accurately. The patents in this case cover technology that helps make that happen. TexasLDPC has six patents for a low-density parity-check (LDPC) decoder. Broadcom

(including codefendants LSI and Avago) has put forth many terms in those patents for construction. I construe some here.

I. Claim Construction

"It is a bedrock principle of patent law that the claims of a patent define the invention to which the patentee is entitled the right to exclude." *Phillips v. AWS Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (internal quotation marks omitted). Claim construction is a matter of law. *See Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 574 U.S. 318, 325–26 (2015). So "[w]hen the parties raise an actual dispute regarding the proper scope of these claims, the court, not the jury, must resolve that dispute." *O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1360 (Fed. Cir. 2008).

A court generally gives the words in a claim "their ordinary and customary meaning," which is the "meaning that [they] would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." *Id.* at 1312–13 (internal quotation marks omitted). Usually, a court first considers the claim language, then the remaining intrinsic evidence, and then, in limited circumstances, extrinsic evidence. *See Interactive Gift Express, Inc. v. Compuserve Inc.*, 256 F.3d 1323, 1331–32 (Fed. Cir. 2001).

Intrinsic evidence includes the patent specification, which "is always highly relevant to the claim construction analysis and indeed is often the single best guide to the meaning of a disputed term." *AstraZeneca AB v. Mylan Pharms. Inc.*, 19 F.4th 1325, 1330 (Fed. Cir. 2021) (internal quotation marks omitted). So a court must construe claims consistent with the specification while "avoid[ing] the danger of reading

limitations from the specification into the claim." *Phillips*, 415 F.3d at 1323. In addition, "[e]ven when the specification describes only a single embodiment, the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words or expressions of manifest exclusion or restriction." *Hill-Rom Svcs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1372 (Fed. Cir. 2014) (internal quotation marks omitted) (alteration in original).

A court may refer to extrinsic evidence only if the disputed term's ordinary and accustomed meaning cannot be discerned from the intrinsic evidence. *See Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1584 (Fed. Cir. 1996). Although a court may not use extrinsic evidence to vary or contradict the claim language, extrinsic materials "may be helpful to explain scientific principles, the meaning of technical terms, and terms of art that appear in the patent and prosecution history." *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 980 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370 (1996). Extrinsic evidence is used "to ensure that the court's understanding of the technical aspects of the patent is consistent with that of a person of skill in the art." *Phillips*, 415 F.3d at 1318. The Federal Circuit has cautioned against relying on expert reports and testimony that is generated for the purpose of litigation because it is often biased. *Id.*

Ultimately, "[t]he construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be … the correct construction." *Renishaw PLC v. Marposs Societa' per Anzioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998). It follows that "a claim interpretation that would exclude the

inventor's device is rarely the correct interpretation." *Modine Mfg. Co. v. U.S. Int'l Trade Comm'n*, 75 F.3d 1545, 1550 (Fed. Cir. 1996).

II. TERMS

Broadcom has asked me to construe ten terms (or sets of terms). Five are ordinary, so I start with those. I then address two terms that Broadcom says are part of means-plus-functions claims and thus governed by special claim-construction rules. Finally, I address three terms that Broadcom says are indefinite.

For convenience, I begin my discussion of each term (or set of terms) with a table that lays out the parties' suggested constructions along with my decision.

A. Ordinary Terms

1. *"R new message"; "R old message"; "R prev message"*

	TexasLDPC	Broadcom et al.	The Court
R new message	Plain and ordinary meaning, which is current R message	Defined in the specification as an R message that is "being computed for the present layer in the present iteration"	An R message that is being computed for the present layer in the present iteration
R old message	Plain and ordinary meaning, which is R message that comprises information computed in the previous iteration	Defined in the specification as an R message that was "computed in the previous iteration" for "the next layer to be processed in the present iteration"	An R message that was computed in the previous iteration for the next layer to be processed in the present iteration

	TexasLDPC	Broadcom et al.	The Court
R prev message	Plain and ordinary meaning, which is delayed old R message	Defined in the specification as an R message that was "computed in the previous iteration" for "the layer presently being processed in the present iteration"	An R message that was computed in the previous iteration for the layer presently being processed in the present iteration

Patentees can be their own lexicographers. So when a patent defines a term, courts will usually accept that definition. *Sinorgchem Co., Shandong v. Int'l Trade Comm.*, 511 F.3d 1132, 1138 (Fed. Cir. 2007). But there are qualifications. First, it is not always clear when a patent is *defining* a term rather than explaining it. *Baxalta Inc. v. Genentech, Inc.*, 972 F.3d 1341, 1347 (Fed. Cir. 2020). Second, courts favor reading patents to be internally consistent. *Id.* This applies to finding consistency across groups of related patents, too.

The patents at issue share specifications. Each has the same Figure 5 with the same explanatory language:

> In discussing the present and subsequent embodiments, a distinction is made regarding the various R messages presented. Assume, for example, that layer I and iteration i are presently being processed. The next layer to be processed in the present iteration i has R messages that were computed in the previous iteration. These messages are termed "R old" messages. The layer presently being processed in the present iteration has R messages that were computed in the previous iteration. These messages are termed "R prev" messages. The R messages that are being computed for the present layer in the present iteration are termed "R new" messages.

'023 patent 10:64–11:8; '140 patent 10:66–11:10; '250 patent 11:46–57; '522 patent 11:46–57; '530 patent 11:56–67; '950 patent 12:2–13. I adopt these definitions as constructions.

There are several reasons to treat this language as definitional. First, it puts the terms in quotation marks and introduces them with "termed." These are classic textual markers of definitions. *See Sinorgchem*, 511 F.3d at 1136. Second, Figure 5 is the first time "R new message," "R old message," and "R prev message" are used in the figures, and this definitional language is the first time they are used in the specification. It is common practice to define terms the first time they are used. Third, the reference to "present and subsequent embodiments" suggests that these definitions are not somehow limited to Figure 5 or its embodiments.

The patent prosecution history confirms this reading. In response to the examiner's rejection of certain claims because "R new" and "R old" were indefinite, the inventors wrote, "Applicants respectfully submit that the terms 'R new' and 'R old' messages are defined by the specification, and respectfully request that the rejections under § 112 be withdrawn." App. 144. They pointed to this same definitional language as support. *Id.* TexasLDPC hastens to add that the inventors also said that the terms are "further elucidated" by certain equations and "the remainder of the specification where the terms are discussed throughout." *Id.* Fair enough. But "further elucidated" does not mean "contradicted."

TexasLDPC's primary objection is that adopting these definitions would create internal inconsistency. As support, TexasLDPC points out that "the asserted claims of the '950 Patent require an 'R old message' to be produced for the currently processed layer, but Defendants' construction of 'R old message' requires it to be produced for 'the next layer.'" Br. 18. But claims in the '950 patent, the last issued,

cannot overcome explicit definitions in the other five patents and change their meaning retroactively.

Finally, if the intrinsic record left any doubt, I would find the explanation of Broadcom's expert, Dr. Zhang, helpful. He explained that these definitions specify both the layer and the iteration in order to pick out just one value, whereas TexasLDPC's proposed constructions include only iteration information and so are incomplete. Tr. 97:3–98:4.

For all these reasons, I construe these three terms to have the definition provided in the specification.

2. *"partial state"*

TexasLDPC	**Broadcom et al.**	**The Court**
Plain and ordinary meaning	Two up-to-date least minimum Q messages	Information that is tracked while Q messages are processed

Just before the hearing, Broadcom proposed a "compromise" construction for "partial state": "Stored information that is tracked while Q messages are serially processed and used to determine the final state." Tr. 102:2–18; 106:5–18. This construction resolved several flaws in Broadcom's original proposal, so it was the starting point for discussion at oral argument. Broadcom did not press for "and used to determine the final state," likely recognizing that partial state information can have other uses. The remaining disputes were over "stored" and "serially." Tr. 106:22–107:20.

"Stored" is unnecessary and likely to create confusion. All information that is tracked is, one way or another, stored. So "stored" is implied by "tracked," as the parties' experts agreed. Tr. 109:5–110:23; 113:2–19. And specifying that partial state

information must be "stored" is likely to create confusion, as it might be read to require a certain kind of storage. The patents are not so limited. So I omit "stored" from the construction.

"Serially" is also likely to create confusion. The two classic forms of processing disclosed by the patents are serial (one at a time) and parallel (all at the same time). But there are forms of processing that combine elements of each. The patents call them "block serial" or "block parallel," and the literature often calls them "partial parallel." Tr. 113:24–114:3; 116:23–117:3. Some hybrid forms of processing use partial state information. (Indeed, TexasLDPC's expert, Dr. Mitzenmacher, explained that even strictly parallel processing can have a partial state. Tr. 116:18–20.) Including "serially" in the construction might be read to exclude these partially serial forms. So, to avoid confusion and cover every application of partial state information contemplated by the patents without sweeping too broadly, I omit "serially" from the construction.

3. *"a final state for [each / a] block row"*

TexasLDPC	**Broadcom et al.**	**The Court**
Plain and ordinary meaning	The first and second minimum magnitudes of all Q messages in a block row with offset applied	Information from processing Q messages in a block row and used to select R messages

Just before the hearing, Broadcom proposed a "compromise" construction for "a final state for [each / a] block row": "Stored information originating from serially processing all Q messages in a block row and used to select R messages for the block row." Tr. 128:10–130:6. This construction resolved several flaws in Broadcom's original proposal and was the starting point for discussion at oral argument. The

remaining disputes were over "stored," "originating," "serially," "all," and "for the block row." Tr. 129:24–130:6.

I omit "stored" and "serially" for the same reasons as in "partial state." And I omit "originating" as superfluous.

I also omit "all" and "for the block row." These words are unduly limiting. The claim language uses the indefinite article, referring to "*a* final state," suggesting that there is more than one final state for each block row. That is consistent with the technology. In sub-block processing, for example, each sub-block will yield a final state, and the final states together will yield the final state for the block row. Those sub-block final states can be stored in a final state storage array. If confirmation were needed, I would be persuaded by Dr. Mitzenmacher's explanation that sub-block final states can be used again in processing. Tr. 146:23–147:16. So construing "a final state for a block row" as "information from processing *all* Q messages in a block row and used to select R messages *for the block row*" would effectively rewrite "a" as "the," excluding the possibility of reusing these individual final states.

4. *Variables*

	TexasLDPC	**Broadcom et al.**	**The Court**
M1 ('250 patent claim 41)	Plain and ordinary meaning	A first minimum value determined by a first comparator	No construction necessary
M2 ('250 patent claim 41)	Plain and ordinary meaning	A second minimum value determined by a second comparator	No construction necessary
$M1_{PS}$ ('250 patent claim 41)	Plain and ordinary meaning	A first stored minimum value input into a first comparator	No construction necessary

	TexasLDPC	Broadcom et al.	The Court
$M2_{PS}$ ('250 patent claim 41)	Plain and ordinary meaning	A second stored minimum value input into a second comparator	No construction necessary
M1 ('530 patent claim 11)	Plain and ordinary meaning	The number of rows of a layer of a first LDPC matrix processed in parallel	No construction necessary
M2 ('530 patent claim 11)	Plain and ordinary meaning	The number of rows of a layer of a second LDPC matrix processed in parallel	No construction necessary

After the hearing, TexasLDPC withdrew its infringement assertion against claim 41 of the '250 patent. D.I. 481. So the dispute over these terms is now moot.

5. *"LDPC array parameters"*

TexasLDPC	Broadcom et al.	The Court
Plain and ordinary meaning	p (prime number representing size of square permutation matrix in the LDPC parity check matrix), k (check node degree), j (variable node degree) and q (number of rows/columns punctured) for array codes	p (prime number representing size of square permutation matrix in the LDPC parity check matrix), k (check node degree), j (variable node degree) and q (number of rows/columns punctured) for array codes

"LDPC array code" is a term of art that refers to a mathematically specified type of code. But "array," on its own, has a generic meaning: a structured collection of things. The patents use both meanings of the term. The question here is whether "LDPC array parameters" refers to array code or is interchangeable with "LDPC matrix parameters." I find that "LDPC array parameters" refers to array code and so adopt Broadcom's construction. That construction is drawn from the specification's definition of array code parameters and adds the parameter used to enable rate-

compatible decoding, as required by the claim. *See* '522 patent 6:12–55, 13:11–17; *see also* Br. 40–41; App. 82–85.

Although "array" is used in a generic sense in the specification, it is never used to mean "matrix." Indeed, counsel for TexasLDPC admitted as much at the hearing. Tr. 162:3–14. Instead, it is used to refer to a collection of units. Yet that is not its function in this claim term, leaving only LDPC array code as a possible meaning. And it is more reasonable to give the term one of the meanings it already has in the patent than to assign it a new meaning seen nowhere else.

TexasLDPC objects that a person of ordinary skill in the art would understand LDPC array parameters "to mean *any* parameters affecting the structure and content of an H matrix." Br. 42. So, because both block codes and array codes can be made multi-rate compatible in the specification, a person of ordinary skill in the art would change whichever parameters accomplish that goal. The trouble is that this reading seems to read "LDPC array" out of the claim by making it synonymous with the broadest reading of "parameters." And we presume that each word in a claim has meaning.

In sum, although "LDPC array parameters" is ambiguous, I find it appropriate to assign it the meaning consistent with the language of the specification rather than a new, broad meaning that would render some words superfluous.

B. Terms in Means-Plus-Function Claims

Now, I move on to terms that Broadcom says are part of means-plus-function claims. Though patent terms are usually not limited by the specification, they are for means-plus-function claims. 35 U.S.C. § 112(6) (current version at 35 U.S.C. § 112(f)).

So if a claim qualifies as means-plus-function, § 112(6) applies, and I must look to the specification to limit its terms.

If a claim uses the word "means," there is a rebuttable presumption that § 112(6) applies. *See Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015) (en banc). On the other hand, if a claim does not use the word "means," courts rebuttably presume that § 112(6) does not apply. *See id.* To establish that a claim without the word "means" is governed by § 112(6), a party must show that the term alleged to be the equivalent of "means" is "understood by persons of ordinary skill in the art to have a sufficiently definite meaning as the name for structure." *Id.* at 1349.

As always, a court first looks to intrinsic evidence to decide this. But extrinsic evidence is particularly helpful here: "[B]ecause this inquiry turns on the understanding of a person of ordinary skill in the art, we often look to extrinsic evidence when determining whether a disputed limitation would have connoted structure to a person of ordinary skill." *Dyfan, LLC v. Target Corp.*, 28 F.4th 1360, 1366 (Fed. Cir. 2022). There are many ways to connote sufficient structure, including describing "a class of structures" or describing "the claim limitation's operation and how the function is achieved in the case of the invention." *Id.* (internal quotation marks omitted).

1. *"control unit"*

TexasLDPC	**Broadcom et al.**	**The Court**
Plain and ordinary meaning; not governed by § 112(6)	Should be construed under § 112(6) **Structure**: indefinite—no corresponding structure identified in specification **Function**:	Plain and ordinary meaning; not governed by § 112(6)

TexasLDPC	Broadcom et al.	The Court
	"controls decoder processing" ('023 patent claim 1; '530 patent claim 25)	
	"controls processing by the decoding circuitry" ('950 patent claim 1)	
	"cause the decoder to process blocks of an LDPC matrix in a sequence defined by an order of non-zero blocks of a given layer of the LDPC matrix" ('530 patent claim 25)	
	"cause the decoder to process blocks of a low density parity check ("LDPC") matrix out of order" ('023 patent claim 1)	
	"cause the decoding circuitry to process blocks of a layer of the LDPC matrix out of order" ('950 patent claim 1)	
	"schedule computation of R messages for a first non-zero block and computation of P messages and Q messages for a second non-zero block such that R messages for the first non-zero block are generated while processing the second non-zero block based on a determination of need for the R messages for the computation of P and Q messages for the second non-zero block" ('023 patent claim 1)	
	"causes the decoder to process layers of the LDPC matrix out of order" ('023 patent claim 2)	
	"schedules no processing of zero blocks of the LDPC matrix" ('023 patent claim 8)	
	"cause the decoder to scheduling R new message computation of a block independent of partial state processing of the block row to which the block belongs" ('023 patent claim 9)	
	"cause the decoder to process each block of the matrix in processing substeps" ('023 patent claim 11)	
	"cause the decoding circuitry to process each block of the LDPC matrix in processing substeps" ('950 patent claim 1)	

Because "control unit" does not use the word "means," Broadcom bears the burden of showing that it is nevertheless governed by 35 U.S.C. § 112(6). It has not met that burden. "Control unit" connotes sufficient structure and has a readily understandable meaning: a hardware component that provides control-level information (such as scheduling) to the rest of the decoder.

"Unit" certainly provides *some* structure. As the claim context shows, a "unit" is a hardware component on a decoder chip. And I accept Dr. Mitzenmacher's declaration that this structure would be readily apparent to a person of ordinary skill in the art. *See* App. 305–06. It is thus not a black box or a nonce term equivalent to "means."

But Broadcom wants more. Because there are many ways to build a unit, Broadcom argues, the inventors needed to spell out the microarchitecture of a control unit. They point out that other "unit" terms have such microarchitectures described in the specification. *See* Br. 57, 59, 62, 64. As a fallback, TexasLDPC notes that there is a microarchitecture for a control unit, too. *See* '950 patent 13:36–38, 16:61–17:2.

But I do not find a microarchitecture necessary. The question is not whether "unit" connotes *comprehensive* structure, but rather whether it connotes *sufficient* structure. *See Dyfan*, 28 F.4th at 1365–66. It does: it is sufficient that a control unit is a hardware component on a decoder chip with defined inputs, outputs, and connections. *See Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1299 (Fed. Cir. 2014) ("Structure may also be provided by describing the claim limitation's operation, such as its input, output, or connections."), *overruled on other grounds by Williamson v. Citrix Online, LLC*, 729 F.3d 1339 (Fed. Cir. 2015); *cf. Samsung Elecs. Am., Inc. v. Prisua Eng'g*

Corp., 948 F.3d 1342, 1353–54 (Fed. Cir. 2020) ("As used in the claims of the '591 patent, the term 'digital processing unit' clearly serves as a stand-in for a 'general purpose computer' or a 'central processing unit,' each of which would be understood as a reference to structure in this case, not simply any device that can perform a particular function."); *Linear Tech. Corp. v. Impala Linear Corp.*, 379 F.3d 1311, 1320 (Fed. Cir. 2004) (finding that "when the structure-connoting term 'circuit' is coupled with a description of the circuit's operation, sufficient structural meaning generally will be conveyed"). So I do not find that "control unit" is governed by 35 U.S.C. § 112(6), and I construe it to have its plain and ordinary meaning.

2. *"check node unit"*

TexasLDPC	Broadcom et al.	The Court
Plain and ordinary meaning; not governed by § 112(6)	Should be construed under § 112(6) **Structure**: microarchitecture 200 as configured in Figure 2A or Figure 3 of the '250 patent **Function**: "perform[] block parallel processing" ('250 patent claim 30) Receive a "[Q/variable] message" provided to the unit ('250 patent claims 6, 13; '522 patent claim 27; '520 patent claim 13) Partial state processing ('950 patent claims 1, 9)	Plain and ordinary meaning; not governed by § 112(6)

The dispute over "check node unit" tracks the dispute over "control unit." I asked the experts to submit letters identifying uses of the term in the field around 2008. *See* D.I. 464. Their reports confirm that the issue is whether "unit" is a name for

structure. *See* D.I. 482, 483. As discussed above, it is. And the inputs, outputs, and functions of check node units are well established in the patents. So I find that this term is not governed by § 112(6) and give it its plain and ordinary meaning.

C. Allegedly Indefinite Terms

Finally, I construe three terms that Broadcom says are indefinite and thus, invalid under § 112(2). "The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." 35 U.S.C. § 112(2) (current version at 35 U.S.C. § 112(b)). So "a patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). The party asserting indefiniteness bears the burden of proving it by clear and convincing evidence. *See* 35 U.S.C. § 282(a); *see also Nautilus*, 572 U.S. at 912 n.10; Noonan & Kelly, *Patent Claim Construction in the Federal Circuit* § 5:1 (2022 ed.).

1. *"the check node degree"*

TexasLDPC	Broadcom et al.	The Court
Plain and ordinary meaning	Indefinite	No construction necessary

After the hearing, TexasLDPC withdrew its infringement assertion against claim 41 of the '250 patent. *See* D.I. 481. So the dispute over "the check node degree" is now moot.

2. *"without active routers"*

TexasLDPC	Broadcom et al.	The Court
Plain and ordinary meaning	Indefinite	Plain and ordinary meaning

Claim 27 of the '522 patent describes, in part, "an array of CNUs [check node units], the CNUs of the array interconnected, without active routers, to provide incremental shifts." I find that Broadcom has not met its burden of showing indefiniteness by clear and convincing evidence. I construe the term according to its plain and ordinary meaning: by passive wired interconnection.

Claims are construed in light of the patent as a whole. And claim 20 sheds light by describing routing that "is accomplished by passive wired interconnection, rather than by active routers." This strongly suggests that "without active routers" means "by passive wired interconnection."

The specification supports this interpretation. It describes embodiments that "use constant wiring … thus eliminat[ing] both the forward router … and the reverse router." '522 patent 10:37–44. This language, in concert with claim 20, leaves open only one understanding: Active routers are routers that are in use, routing messages as they come along. If a decoder does not use active routers, it is using passive wired interconnections. One way to make the wiring passive is to eliminate routers altogether, which the specification calls constant wiring. Another way to make the wiring passive is to have routers but not use them—that is, to pre-arrange the routers so that messages simply pass along them without the routers' actively considering where to send the messages. Thus, based on the intrinsic evidence, "without active

routers" means by passive wired interconnection—whether that interconnection is passive because the routers are inactive or because there are no routers.

Broadcom objects that this interpretation renders "by passive wired interconnection, rather than by active routers" superfluous. Br. 72; '522 patent, claim 20. I disagree. Claim 20 is the first time "active routers" is used in the '522 patent claims. So it makes sense to explain that it is the alternative to "passive wired interconnection." The next time the patent uses "active routers" in claim 27, it appropriately omits this explanation.

If the intrinsic evidence were not convincing enough, I would also find Dr. Mitzenmacher's explanation helpful. *See* Tr. 239:1–242:6. As he explained, a person of ordinary skill in the art would understand that routers can be pre-set along wiring without actively routing information in a particular cycle. *See id.* This is consistent with the construction compelled by the intrinsic record.

Because it would be clear to a person of ordinary skill in the art that "without active routers" means by passive wired interconnection, I give this term its plain and ordinary meaning. If it becomes apparent that the jury is likely to be confused, I will consider spelling out the construction at that time.

3. *"total number of elements in [a/the] block row [in/of] [the/a] LDPC [parity check] matrix"*

TexasLDPC	Broadcom et al.	The Court
Plain and ordinary meaning	Indefinite	Indefinite

Claim 30 of the '250 patent includes an array of units that "processes a plurality (U) of block columns of a plurality (M) of rows in a layer of an LDPC parity check

matrix in one clock cycle, where M≤p, and p is a total number of elements in a block row of the LDPC parity check matrix; U≤d_c, and d_c is check node degree of the block row." Claim 11 of the '530 patent uses similar language, and the parties agree that the same analysis applies to both. The question is what "elements" means in these claims. That word is not used in this context anywhere in the patents. I find this term indefinite.

In its briefs, TexasLDPC argued that "elements" means "rows." *See* Br. 74. But this construction is untenable. "[R]ows" is used in the very same sentence as "elements," so they must be understood to have different meanings. Sensing this, TexasLDPC's counsel pivoted at the hearing, arguing that that "elements" *could* mean rows or could have a broader meaning. Tr. 253:7–254:19. Dr. Mitzenmacher agreed. Tr. 258:2–6.

That leaves us with only one remaining clue: that M≤p. Rewritten, this means that the total number of elements in a block row of an LDPC matrix is greater than or equal to a plurality of rows in a layer of that matrix. M has upper and lower bounds: because it is a plurality, M must be at least 2, and because it is a count of rows, M cannot be larger than the number of rows. But p has far less definite bounds. Because p is at least equal to M, its lower bound is also 2. But its only upper bound is the highest possible count of elements in a block row. This equation, then, also fails to tell us what an element is. The only things we can glean from the claim are that (1) an element is not necessarily a row, and (2) there are at least 2 elements in a block row. That leaves far too many options for "elements" to be definite.

Recognizing this problem, TexasLDPC appeals to context. Dr. Mitzenmacher argued that "elements" would mean a row or a group of rows. Tr. 258:17–260:23. But he would not rule out the possibility that it could also include subcomponents of a row. Tr. 260:24–261:11. Counsel then tried to backtrack, arguing that any subcomponent would be irrelevant to processing and so a person of ordinary skill in the art would only think of elements as including rows or groups of rows. Tr. 264:1–265:1; 266:23–267:14. This confusion illustrates the problem. TexasLDPC wants me to read "elements" as meaning a row or group of rows, but neither the claim nor the technology is so limited. At best, "elements" is a placeholder for anything that is technologically possible and at least equal to 2. That claim term is not definite.

* * * * *

With these constructions, the parties can start narrowing this case. Afterwards, I will consider the need for more constructions.